SMALL EXPLORERS AND MISSIONS OF OPPORTUNITY

GUIDELINES AND CRITERIA FOR THE PHASE A CONCEPT STUDY REPORT

April 25, 2001

INTRODUCTION

It is planned that a subset of proposed investigations from the SMEX AO will be selected and awarded contracts for Phase A concept studies. The concept study will constitute the investigation's requirements definition phase (Phase A) of the formulation subprocess as outlined in NPG 7120.5A, *NASA Program and Project Management Processes and Requirements*. The purpose of a concept study is to better define the investigation, its implementation requirements, and its risks, as well as to describe the plans for education and public outreach, small disadvantaged businesses, and new technology. Upon completion of the concept study, proposers will submit a Concept Study Report (CSR) for NASA evaluation. The CSR is to be a self-contained document; that is, selected investigators should not assume that NASA evaluators will have reviewed or even have access to the original proposal.

The CSR is due by COB November 16, 2001, at:

SMEX Concept Study Support Office
NASA Peer Review Services
500 E Street, SW
Suite 200
Washington DC 20024
202-479-9030

Please note that all program constraints, guidelines, definitions, and requirements given in the AO are still valid for the CSR except as noted herein.

Part I of this document discusses the criteria to be used by NASA for the evaluation of the CSR's. Part II provides guidance for preparation of the CSR's.

The Appendix A of this document provides definitions of program cost element terms used in the cost plan section (Section K) of this document. Appendix B contains parameters to consider in developing the technical sections of a CSR. Appendix C provides information, including requirements, for the Education/Public Outreach section of the CSR. Appendix D provides an inflation table.

Since the Phase A concept studies have been delayed by NASA, the no later than launch date given in Section 1.3 of the AO has been changed. Mission launch dates must be no later than December 2005 with one launch anticipated by December 2004 and the other by December 2005.

Due to budget constraints in FY02, the available budget to support the selected SMEX missions is constrained in FY02. A profile of funding available in FY02 to the mission selected for the first launch opportunity will be provided in the Kickoff Presentation by Marcus Watkins. It will be difficult to support a mission with requirements which exceed this profile. Concept Study reports should include a mission profile that allows the mission to be accomplished with the resources constraints presented for FY02. However, if the required funding exceeds the available funding in any year, then this should be justified in the Concept Study Report.

NASA has increased the requirements on all NASA projects for mission assurance since the SMEX AO was released. The recommendations of the NASA Integrated Action Team (NIAT) have been incorporated into the SMEX Safety, Reliability, and Quality Assurance Requirements document, which may be found in the SMEX Explorer Program Library. The plan which is presented in the CSR must comply with all applicable requirements. The cost cap will not be increased to accommodate these increased requirements. However, up to $5 M (FY00) of additional content, as required by NIAT, may be accounted for outside of the cost cap. Instructions may be found in Part II, Section M.12 of these Guidelines.

One of the NIAT requirements is that projects have adequate cost reserves. At their Phase B/C Confirmation Review (see Section 7.4.5 of the AO), Explorer projects will be required to demonstrate a minimum cost reserve of 20%, or to justify a cost reserve of less than 20%, against the cost to complete (not including the launch vehicle or MO&DA). Additional reserves are a NIAT requirement and may be accounted for against the credit discussed above.

Proposers should contact Darrell Foster at KSC for updated information on ELV costs. These costs must be documented in an email from Darrell Foster and included in the CSR. Any increase in cost for the same launch services as proposed in stage 1 will not be assessed against the cost cap as long as requirements have not changed (i.e. no special services, etc.). Budget estimates and charts should clearly show the actual ELV costs, as provided by KSC. The budget should also show, in some straightforward way, what the difference in cost is between the original costs (as documented in the SMEX Expendable Launch Vehicle Opportunities document, which may be found in the SMEX Explorer Program Library) and the actual costs. The difference will be used to verify that the proposed cost is still within the SMEX cost cap.

Those proposing launches where there is known risk of launch delays beyond the project's control (e.g. Space Shuttle launch, shared ELV launch) should address how they will manage that risk within the proposed cost and schedule. If the proposed launch opportunity is a secondary or co-manifested payload on an ELV, the proposer must identify the opportunity and provide evidence that the launch service provider agrees to manifest the investigation.

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The one-day review of the concept study results approximately two thirds of the way through the Phase A study, mentioned in section 7.4.3 of the AO will not occur.

PART I - PHASE A CONCEPT STUDY REPORT EVALUATION CRITERIA

The NASA evaluation of the Concept Study Reports will be evaluated on the criteria (see below) defined in Section 7.4.4 of the AO. This evaluation will consider in detail all factors related to the probability of mission success and to the realism of the proposed costs to NASA. This evaluation will also consider other factors that enhance the return on NASA's investment in the investigation such as new technology, education and public outreach, and small disadvantaged business activities.

Successful implementation of the Explorer Program demands, in addition to scientific merit, that the investigation be achievable within the established constraints on cost and schedule. The information requested in Part II of this document will enable the evaluation panel to determine how well each mission team understands the complexity of its proposed investigation, its technical risks, and any weaknesses that require specific action during Phase B.

The evaluation criteria to be used for evaluation of the Concept Study Report are as follows:

- Scientific merit of investigation
- Technical merit and feasibility of the science implementation
- Feasibility of the proposed approach for mission implementation, including cost risk
- Quality of plans for education and public outreach
- Quality of plans for new technology and small disadvantaged business activities

The first two criteria are the same as described in Section 7.2 of the AO (sections 7.2.1 and 7.2.2). The science objectives must not change from those given in the proposal. Any changes to science implementation will be carefully evaluated. If there are no substantive changes in the science implementation, then the scientific merit of the proposed investigation (first criterion) and the technical merit of the science investigation (half of second criterion) will not be reevaluated. In this case, the evaluations of scientific merit and of technical merit of science implementation of the original proposal will be used. Assuming that there are not changes to the proposed science or its implementation, the emphasis of the evaluation will be on the technical feasibility of the science implementation (other half of the second criterion) and on the latter three criteria, more fully described below. Of these criteria, the feasibility of proposed approach for mission implementation, including the technical feasibility of the science implementation, is of more importance than the combination of the last two criteria, which are of equal importance. Total cost to NASA OSS will be a selection but not an evaluation criterion.

Scientific Merit of the Investigation

It is expected that the science objectives will not change from those given in the original proposal. The scientific merit of each investigation as established by the peer review of the original proposal will, however, be reexamined to determine if significant changes have occurred. The definition for evaluating this criterion is the same as in section 7.2.1 of the AO.

Technical Merit and Feasibility of the Science Implementation

The information requested in Part II of this document will be used to evaluate each investigation in detail for its technical merit and feasibility of the science implementation. It is expected that the factors contributing to the technical merit of the science implementation (e.g., choice of instruments, instrument capabilities such as sensitivity or resolution, choice of mission design, etc.) will not change from those given in the original proposal. The technical merit of the science investigation as established by the peer review of the original proposal will, however, be reexamined to determine if significant changes have occurred. The definition for evaluating this criterion is included in section 7.2.2 of the AO.

As discussed above, the focus in evaluating the CSR for this criterion is the feasibility of the science implementation. It is anticipated that the factors contributing to the feasibility of the science implementation (e.g., degree to which proposed instruments can be built within proposed resources using the proposed technologies) may change from those given in the original proposal and will certainly be refined. The definition for evaluating this criterion is included in section 7.2.2 of the AO.

Feasibility of the proposed approach for mission implementation, including cost risk

The information requested in Part II of this document will be used to evaluate each investigation in detail for the feasibility of mission implementation as reflected in the perceived risk of accomplishing the mission within proposed resources.

The technical and management approaches will be evaluated to assess the likelihood that the investigation can be implemented as proposed. This will include an assessment of the risk of completing the investigation within the proposed cost. The evaluation will consider implementation factors such as the proposed launch vehicle including reliability, mission design, spacecraft design, and design margins, and the proposers' understanding of the processes, products, and activities required to accomplish development and integration of all elements (flight systems, ground and data systems, etc.). It will also consider the adequacy of the proposed approach, the organizational structure, the roles and experience of the known partners, the management approach, the commitments of

partners and contributors, and the team's understanding of the scope of work (covering all elements of the mission, including contributions). The relationship of the work to the project schedule, the project element interdependencies, and associated schedule margins will also be evaluated. Investigations proposing new technology will be penalized for risk if adequate backup plans to ensure success of the mission are not described. The proposal must discuss the methods and rationale (cost models, cost estimating relationships of analogous missions, etc.) used to develop the estimated cost and must include a discussion of cost risks. Innovative cost effective features, processes, or approaches will be rewarded if proven sound.

This evaluation will consider the proposer's understanding of the processes, products, and activities required to accomplish development of all elements (e.g., instruments, flight systems, ground and data systems, etc.), the integration of all elements, and the adequacy of the proposed approach including reserves and margins. The technical approach will be examined in its entirety to ensure that: (1) all elements and processes are addressed, (2) weaknesses and design issues are understood and plans for resolution have been identified, (3) fundamental design trades have been identified and studies planned and (4) primary performance parameters have been identified and minimum thresholds established. GFE, as defined in the AO, will be assessed to verify that it is being used within its intended capability. The overall approach (including schedule), the specific design concepts, and the known hardware/software will be evaluated for soundness, achievability, and maturity. Resiliency and design performance margins will be factors in this evaluation. Proposers should address how developmental problems with new technology will be addressed in order to ensure mission success. The experience and expertise of the development organizations will be important factors in assessing the probability of success. Innovative cost effective features, processes, or approaches will be rewarded if proven sound.

The credibility and realism of the cost estimates and the planned financial resiliency will be evaluated. The underlying rationales for the cost estimates including reserves, and the development schedule, including schedule margins, will be factors in this evaluation. The adequacy of reserves in the context of the recommendations of the NASA Integrated Action Team (NIAT) are also factored into this evaluation.

The information provided in the Management section should demonstrate the proposers' plans, processes, tools, and organization for managing and controlling the development and operation of the mission, including performance measurement and reporting. The soundness and completeness of the approach and the probability that the management team can assure mission success will be evaluated by reviewing the organizational structure (including roles, responsibilities, accountability, and decision making process) and the processes, plans, and strategies the team will use to manage the various mission elements through all phases of the mission. Factors in this evaluation will include: clear lines of authority, clean interfaces, prudent scheduling and cost control mechanisms, review processes, and demonstrated awareness of all necessary management processes. The adequacy with which risk management activities are planned and budgeted

incorporating the recommendations of the NASA Integrated Action Team (NIAT) Report, are also factored into this evaluation. Additional factors in the evaluation of the probability of mission success will include the experience, expertise, and commitment of key personnel and the organizations to which they are attached, the adequacy of facilities and equipment proposed for the mission, the adequacy of the team's approach to risk management, and the adequacy of the management and control mechanism. Innovative management processes and plans will be rewarded if proven to be sound.

The completeness of the Phase B plans will be considered in determining the adequacy of the Phase B approach. This will include an evaluation of the activities/products, the organizations responsible for those activities/products, and the schedule to accomplish the activities/products.

Quality of Plans for Education and Public Outreach

All proposed investigations must include an Education/Public Outreach component as part of their Concept Study Report. The criteria to be used to evaluate the E/PO component and a discussion of those criteria are given in Appendix C and described further in the document *Explanatory Guide to the NASA Office of Space Science Education and Public Outreach Evaluation Criteria* (April 1999) which may be found by linking through the Education and Public Outreach Web site at the URL http://spacescience.nasa.gov or through the SMEX library. See Appendix C of this document and section 3.7.1 of the AO for further details on the E/PO requirements.

Quality of Plans for New Technology and Small Disadvantaged Business Activities

The new technology plan will be reviewed to determine the extent to which it meets the requirements given in section 3.7.2 of the AO.

The small disadvantaged business plan will be evaluated to determine the extent to which it meets the participation requirements and goals given in section 3.7.3 of the AO.

PART II - PHASE A CONCEPT STUDY REPORT: REQUIRED QUANTITIES, MEDIA, FORMAT, AND CONTENT

Fifty paper copies of the Concept Study Report are required. An additional 25 copies of the Fact Sheet (see Section C below) are required. In addition, one zip disk or CDROM containing an electronic version of the CSR is required (the PDF format is preferred). The required uniform format and contents are summarized below. Failure to follow this outline may result in reduced ratings during the evaluation process and could lead to the investigation not being confirmed for continuation.

When changes have been made to any data provided with the original proposal as a result of the concept study, these changes from the proposal should be clearly identified. The content of each requirement is discussed in the subsequent paragraphs. Note that all program constraints, guidelines, requirements, and definitions given in the AO are still valid for the Concept Study Report except as noted herein.

The CSR shall contain no more than 132 pages, including no more than seven foldout pages (28 x 43 cm; i.e., 11 x 17 inches). Three-ring binders may be used.

- A foldout page counts as one page
- All pages other than foldout pages shall be 8.5 x 11 inches or A4 European Standard
- Single- or double-column format is acceptable.
- In complying with the page limit, no page may contain more than 55 lines of text and the type font must not be smaller than 12-point except within figures and tables, where the type font must not be smaller than 10-point.

The following page limits apply:

Section	Page Limit
A. Cover Page and Investigation Summary	No page limit, but be concise
B. Table of Contents	2
C. Fact Sheet	2
D. Executive Summary	5
E. Science Investigation (changes highlighted)	25
F. Technical Approach G. Management Plan H. New Technology, and Small Disadvantaged Business Plan I. Phase B Plan	94
J. Education and Public Outreach	4
K. Cost Plan for Phases A through E	No page limit, but data must be presented in formats described; be brief
L. Changes required for and implications of being the second SMEX launched under this AO	No page limit, but be brief
M. Appendices (No other appendices permitted) 1) Letters of Endorsement 2) Relevant Experience and Past Performance 3) Resumes 4) Statement(s) of Work 5) Mission Definition and Requirements Agreement 6) Orbital Debris Analysis 7) Data Management Plan 8) Any Incentive Plan(s) 9) Any NASA PI Proposing Team 10) Technical Content of Any International Agreements 11) Discussion on Compliance with U.S. Export Laws and Regulations – Update from Proposal 12) Additional Activities for NIAT 13) Acronyms List 14) References List (Optional)	No page limit, but small size encouraged

A. COVER PAGE AND INVESTIGATION SUMMARY

A Cover Page and Investigation Summary must be a part of the proposal, but will not be counted against the page limit. It must be signed by the Principal Investigator and an official by title of the investigator's organization who is authorized to commit the organization. Create a custom cover page which contains the following information. The full names of the Principal Investigator and the authorizing official, their addresses with zip code, telephone and fax numbers, and electronic mail addresses, are required, as well as the names, institutions, and E-mail addresses of all participants, the type of investigation proposed, the total NASA OSS Cost, and a 200-word Summary. A hard copy version of this Cover must be printed in time to acquire signatures and include with the original hard copy of the CSR.

B. TABLE OF CONTENTS

The CSR shall contain a table of contents that parallel the outline provided in Sections C through M below.

C. FACT SHEET

A Fact Sheet that provides a brief summary of the proposed investigation must be included. The information conveyed on the Fact Sheet should include the following: science objectives (including the importance of the science to the NASA science themes), mission overview (including mission objectives and major mission characteristics), science payload, key spacecraft characteristics, anticipated launch vehicle, major elements of the E/PO program, mission management (including teaming arrangement as known), schedule, and cost estimate. Other relevant information, including figures or drawings, may be included at the proposer's discretion. The Fact Sheet is restricted to two pages (preferably a double-sided single sheet).

D. EXECUTIVE SUMMARY

The Executive Summary is to be a summary of the contents of the CSR and is to include an overview of the proposed baseline investigation including its scientific objectives, the technical approach, management plan, cost estimate, education and public outreach, technology, and small disadvantaged business plans and delayed launch plan. The Executive Summary should be no more than 5 pages in length.

E. SCIENCE INVESTIGATION

This section shall describe the science investigation resulting from the Concept Study. Any descoping of, or changes to, the investigation from the baseline and minimum mission science defined in the proposal must be identified and the rationale for the change(s) given. Changes may be highlighted in bold with column marking for easy identification. In addition, a CHANGES page up front that does not count against the

page count should summarize significant changes to the Science Investigation section by identifying the original (proposed) requirement, the new requirement, rationale for the change, and its location within the CSR. If there are no changes, this section must be repeated identically from the proposal with a statement that there are no changes.

Special attention should be given to assuring that both the planning and resources are adequate to analyze, interpret, and archive all the data produced by the investigation in the appropriate data archive. Resources include cost, schedule, and man-hours for scientific interpretation of results and publication.

It is expected that changes will be required in the description of the science implementation, especially as relates to the criterion for feasibility. A page quota larger than that in the stage 1 proposal has been allotted for this purpose.

F. TECHNICAL APPROACH

The Technical Approach section should detail the method and procedures for investigation definition, design, development, testing, integration, ground operations, and flight operations. A discussion of all new technologies planned for the investigation should be provided and include backup plans with scheduled decision criteria if those technologies cannot be made ready. This section should also detail the expected products and end items associated with each phase. Mission teams have the freedom to use their own processes, procedures, and methods. The use of innovative processes, techniques, and activities by mission teams in accomplishing their objectives is encouraged when cost, schedule, technical improvements, and risk containment can be demonstrated. The benefits and risks, if any, of any such processes and products should be discussed. This section must be complete in itself without the need to request additional data, although duplications may be avoided by reference to other sections of the CSR if necessary. For Missions of Opportunity, provide the information that is related to the proposed investigation's requirements on and interfaces with the sponsor's instrument/spacecraft. NASA will not be evaluating the sponsoring mission or spacecraft, however, it must have sufficient data about these to understand how the NASA funded project will be implemented.

1) Technical Approach Overview. This section should provide a brief overview of the technical approach including its key challenges.

2) Mission Design. This section should fully describe the operational phase of the mission from launch to end of mission. It should include information on the proposed launch date (including any launch date flexibility), launch location and vehicle, trajectories, Delta-V requirements, orbit characteristics, mission duration, and a preliminary mission timeline indicating periods of data acquisition, data downlink, etc. The mission design should also describe the communications network to be used and interface requirements, along with potential impacts or conflicts with other users of the selected communications

resources. Describe any design trade studies conducted or planned. Any trade studies involving launch vehicles must still require that NASA be the launch service provider unless it is to be a contribution. In such cases, the AO guidelines and constraints for both contributions and launch vehicles will be applicable.

A "traceability matrix" showing how the proposed mission design complies with the stated objectives, requirements, and constraints of the proposed investigation should be included. The rationale for the selection of launch vehicle should be included. The concept study should identify any innovative features of the mission design that minimize total mission costs.

3) Spacecraft. This section should describe the spacecraft design/development approach, particularly as it relates to new versus existing hardware and redundant versus single-string hardware. It should fully identify the spacecraft systems and describe their characteristics and requirements. A description of the flight system design with a block diagram showing the flight subsystems and their interfaces should be included, along with a description of the flight software and the approach for its development, and a summary of the estimated performance of the flight system. The flight heritage or rationale used to select the flight system and its subsystems, major assemblies, and interfaces should be described. The discussion of heritage should address two important issues: (1) prior flight experience or flight-qualified design of specific subsystem components, and (2) overall subsystem design, whether new, modified, or exact repeat of a design flown previously. Cost savings that result from heritage will be quantified and explained in the Cost Plan section (Section J) below. This section should also discuss the design *process* used: trade studies, simulations, technology development, engineering models, prototypes, etc.

Subsystem characteristics and requirements should be described to the greatest extent possible. Such characteristics include current best estimate and contingency for: mass, volume, and power requirements; pointing knowledge and accuracy; new developments needed; space qualification plan; and logistics support. These subsystems may include: structural/mechanical, solar array/power supply (and batteries), electrical, thermal control, propulsion, communications, attitude control, command, and data handling, etc. Any design features incorporated to effect cost savings should be identified; however, benefits should be specified and enabling assumptions or risks should be identified. A summary of the resource elements of the flight systems design concept, including key margins, should be provided. The rationale for, and derivation of, margin allocations including mass, power, communication link, pointing accuracy, etc., should be provided. Those design margins that are driving costs should be identified. Provide data in tables to show the current estimate of computer memory margin and computer

processor utilization margin. A Master Equipment List should summarize component-level information for all hardware subsystems of the spacecraft, any other hardware elements, and instruments.

4) Science Payload. This section should describe the science payload for the investigation. Highlight any changes to the payload or individual instruments or their performance since submission of the proposal. Information pertinent to the accommodation of the instrumentation on the spacecraft should also be included. Subsystem characteristics and requirements should be described. Such characteristics include: mass, volume, and power requirements; pointing requirements; new developments needed; and a space qualification plan. Include where appropriate: block diagrams, layouts, calibration plans, operational and control considerations, and software development. Any design features incorporated to effect cost savings should be identified. A summary of the resource elements of the instrument design concept, including key margins, should be provided. The rationale for margin allocation should be provided. Those design margins that are driving costs should be identified.

5) Payload Integration. This section should characterize the interface between the instruments and the flight system. These include, but are not limited to: volumetric envelope, fields of view, weight, power requirements, thermal requirements, command and telemetry requirements, sensitivity to or generation of contamination (e.g., electromagnetic interference, gaseous effluents, etc.), data processing requirements, as well as the planned process for physically and analytically integrating them with the flight system. The testing strategy of the science payload, prior to integration with the spacecraft, should be discussed.

6) Manufacturing, Integration, and Test. This section should describe the manufacturing strategy to produce, test, and verify the hardware/software necessary to accomplish the mission. It should include a description of the main processes/procedures planned in the fabrication of flight hardware, software, production personnel resources, incorporation of new technology/materials, and the preliminary test and verification program. The environmental tests planned should be discussed and proposed test margins and durations for the environmental test program specified. Part burn-in requirements that will be used for the program should also be defined. Describe the approach for transitioning from design to manufacturing and specify data products which will be used to assure producibility and adequate tooling availability.

   The approach, techniques, and facilities planned for integration, test and verification, and launch operations phases (including launch integration and processing), consistent with the proposed schedule and cost, should be described. A preliminary schedule for manufacturing, integration, and test

activities should be included. A description of the planned end items, including engineering and qualification hardware, should be included.

7) Mission Operations, Ground, and Data Systems. This section should discuss mission operations and the ground operations support required for the proposed investigation. The planned approach for managing mission operations and all flight operations support, including mission planning and scheduling, command sequence generation, uplink commanding, trajectory tracking, and telemetry downlink and analysis should be discussed. Describe all inter-facility communications, computer security, tracking, or near real-time ground support requirements, and indicate any special equipment or skills required of ground personnel. Provide a staffing plan for both mission operations and science payload operations.

   Proposers are free to proposed use of services from sources other than the NASA Space Operations Management Office (SOMO). Services provided by SOMO include support for communications, tracking, mission operations, flight dynamics, and data processing. Costs for such services, whether obtained from NASA or other sources, must be included in the cost estimate. Projects should conduct trade studies on the use of SOMO-provided services versus any proposed alternatives. Explorer projects may optionally conduct such studies in Phase A, but should conduct such studies no later than Phase B. In general, SOMO-provided services should be employed whenever they meet mission objectives at a life-cycle cost to the project or to the Office of Space Science (OSS) that is less than or equal to any proposed alternatives. SOMO will assist Explorer proposers in identifying SOMO services, prices, and cost trades. If OSS and SOMO agree that the proposed approach does not result in the lowest life cycle cost, OSS may direct the Explorer project to modify its approach. This policy is discussed in more detail in the document titled "Freedom of Choice for Space Operations" which is in the SMEX Library.

   The approach to the development of the ground data system, including the use, if any, of existing facilities, including Government facilities, should be described. All usage of the Deep Space Network (DSN) and of any existing non-DSN facilities, including Tracking and Data Relay Satellite System (TDRSS), should be explicitly described. Any mission-unique facilities must be adequately described. Include a block diagram of the Ground Data System (GDS) showing the end-to-end concept (acquisition through archiving in the appropriate data archive) for operations and data flow to the subsystem level. Describe all communications, tracking, and ground support requirements. Describe the space/ground link spectrum requirements and the licensing approach. The NASA Frequency Spectrum Management organizations can be used if the mission uses frequencies allocated to the government and the data transmitted is not used directly for commercial purposes. Describe the

software design heritage and software development approach and its relationship to the flight system software development.

Specific features incorporated into the flight and ground system design that lead to low-cost operation should be identified. The use of any existing mission operations facilities and processes should be described, as well as any new facilities required to meet mission objectives.

8) Facilities. Provide a description of any new, or modifications to existing, facilities, laboratory equipment, and ground support equipment (GSE) (including those of the team's proposed contractors and those of NASA and other U.S. Government agencies) required to execute the investigation. The outline of new facilities and equipment should also indicate the lead time involved and the planned schedule for construction, modification, and/or acquisition of the facilities.

9) Product Assurance, Mission and Safety. This section should describe the process by which the product quality is assured to meet the customer's specifications, including identification of trade studies, the parts selection strategy, and the plans to incorporate new technology. This section should also describe the product assurance plan, including plans for problem/failure reporting, inspections, quality control, parts selection and control, reliability, safety assurance, and software validation. In addition, investigators should be aware of mission assurance topics of recent Agency-level special emphasis for all NASA missions. Such topics include Red Team Reviews, subsystem-level Failure Mode Effects Analysis, Probabilistic Risk Assessment with its subset of analysis tools, Continuous Risk Management, and Software Independent Verification and Validation. Further discussion of these topics can be found in the revised document "SMEX Safety, Reliability, and Quality Assurance Requirements," available from the SMEX Library and the NASA Independent Assessment Team (NIAT) report also in the SMEX Library at http://explorer.larc.nasa.gov/explorer/sel.html

G. MANAGEMENT PLAN

This section sets forth the investigator's approach for managing the work, including the E/PO portion of the program, the recognition of essential management functions, and the overall integration of these functions. This section should specifically discuss the decision-making process to be used by the team, focusing particularly on the roles of the Principal Investigator and Project Manager in that process. The management plan gives insight into the organizations proposed for the work, including the internal operations and lines of authority with delegations, together with internal interfaces and relationships with NASA, major subcontractors, and associated investigators. It also identifies the institutional commitment of all team members (including team members responsible for E/PO), and the institutional roles and responsibilities. The

use of innovative processes, techniques, and activities by mission teams in accomplishing their objectives is encouraged; however, they should be employed only when cost, schedule, or technical improvements can be demonstrated and specific enabling assumptions are identified.

1. Team Member Responsibilities. This section should describe the roles, responsibilities, time commitment, and experience of all team member organizations and key personnel such as E/PO personnel, with particular emphasis placed on the responsibilities assigned to the Principal Investigator, the Project Manager, and other key personnel. In addition, information should be provided which indicates what percentage of time key personnel will devote to the mission, the duration of service, and how changes in personnel will be accomplished. (Note: The experience of the PI and science team members does not need to be included in this section since that is addressed in the science investigation section.)

    a. Organizational Structure. The management organizational structure of the investigation team must be described in the CSR. A Work Breakdown Structure (WBS) must be provided. The CSR must describe the responsibilities of each team member organization and its contributions to the investigation. Each key position, including its roles and responsibilities, how each key position fits into the organization, and the basic qualifications required for each position, must be described. A discussion of the unique or proprietary capabilities that each member organization brings to the team, along with a description of the availability of personnel at each partner organization to meet staffing needs, should be included. The contractual and financial relationships between team partners should be discussed.

    Summarize the relevant institutional experience in this section, and refer to supporting detail included in Section M.2, Relevant Experience and Past Performance. If experience for a partner is not equivalent to, or better than, the requirements for the proposed mission, explain how confidence can be gained that the mission can be accomplished within cost and schedule constraints.

    b. Experience and Commitment of Key Personnel. Provide a history of experience explaining the relationship of the previous experience to each key individual's role; include the complexity of the work and the results.

        i. Principal Investigator. The role(s), responsibilities, and time commitment of the Principal Investigator should be discussed. Provide a reference point of contact, including address and phone number.

ii. Project Manager. The role, responsibilities, time commitment, and experience of the Project Manager should be discussed. Provide a reference point of contact, including address and phone number.

iii. Other Key Personnel. The roles, responsibilities, time commitments, and experience of other key personnel in the investigation including Co-Investigators should be described.

2. Management Processes and Plans. This section should describe the management processes and plans necessary for the logical and timely pursuit of the work (including E/PO), accompanied by a description of the work plan. This section should also describe the proposed methods of hardware and software acquisition. The management processes which the investigator team proposes, including the relationship between organizations and key personnel should be discussed, including the following, as applicable: systems engineering and integration; requirements development; configuration management; schedule management; team member coordination and communication; progress reporting, both internal and to NASA; performance measurement; and resource management. This discussion should include all phases of the mission including preliminary analysis, technical definition, the design and development, and operations phases, along with the expected products and results from each phase. Unique tools, processes, or methods which will be used by the investigation team should be clearly identified and their benefits discussed. All project elements should be covered to assure a clear understanding of project-wide implementation.

3. Schedules. The schedule and workflow for the complete mission life-cycle should be clearly defined, and the method and tools to be used for internal review, control, and direction discussed. Schedules for all major activities, interdependencies between major items, deliveries of end items, critical paths, schedule margins, and long-lead procurement needs (defined as hardware procurements required before the start of Phase C/D) should be clearly identified and discussed.

4. Risk Management. This section should describe the approach to, and plans for, risk management to be taken by the team, both in the overall mission design and in the individual systems and subsystems. Plans for using standard risk management tools, especially fault tree analysis, probabilistic risk assessments, and failure modes and effects analyses, should be described. Particular emphasis should be placed on describing how the various elements of risk, including new technologies used, will be managed to ensure successful accomplishment of the mission within cost and schedule constraints. Investigations dependent on new technology will be penalized for risk if

adequate plans to ensure success of the investigation are not described. The top 3 risks and their mitigation plans should be discussed.

A summary of reserves in cost and schedule should be identified by Phase and project element and year and the rationale for them discussed. The specific means by which integrated costs, schedule, and technical performance will be tracked and managed should be defined. Specific reserves and the timing of their application should be described. Management of the reserves and margins, including who in the management organization manages the reserves and when and how the reserves are released, should be discussed. This should include the strategy for maintaining reserves as a function of cost-to-completion. All funded schedule margins should be identified. The relationship between the use of such reserves, margins, potential descope options, and their effect on cost, schedule, and performance should be fully discussed. When considering potential descope options, consider the investigation as a total system including instrument(s), spacecraft, ground system, launch services, and operations.

5. Government Furnished Property, Services, Facilities, etc. This section should clearly delineate the Government-furnished property, services, facilities, etc. required to accomplish all phases of the mission.

6. Reviews. This section should list the major project reviews expected to be conducted during the project's life cycle and the approximate time frame of each. The objective of each review should be indicated. Systems level reviews will be chaired by the GSFC Systems Management Office. Allowance should also be made for government-initiated independent assessment reviews, such as Confirmation Assessments, Independent Annual Reviews and Red Team Reviews. It should be noted that regular reviews of the progress of the E/PO component of the missions should be held in the same way that progress on the scientific and technical aspects are reviewed.

7. Reporting. This section should clearly describe the approach to reporting progress to the Government and indicate the progress reviews the Government is invited to attend to provide independent oversight. The process, including the individual or organization responsible for reporting integrated cost, schedule, and technical performance should be discussed. A description of the information to be presented should be included. Planned project status reporting should include quarterly presentations to the governing Program Management Council (PMC), monthly status reporting to the Explorer Program Office and after the Project Critical Design Review (CDR), a brief weekly summary of progress via a web based NASA Office of Space Science reporting site.

8. Software Independent Verification and Validation (IV&V). This section should describe the plan to obtain software IV&V from the NASA IV&V Facility in Fairmont, West Virginia for all project-produced flight and ground software, or to obtain approval from the Fairmont facility to substitute a center or contractor IV&V process instead.

For Mission of Opportunity, in addressing the areas above, describe how the investigation team will interrelate with the sponsoring organization, organizationally and managerially. Mission of Opportunity proposals should also describe:

- The status of the commitment from the spacecraft builder/owner or sponsoring organization to fly the proposed instrument or conduct the proposed investigation.
- If and how the proposed investigation relates to the spacecraft sponsor's overall mission objectives.

H. NEW TECHNOLOGY AND SMALL DISADVANTAGED BUSINESS PLAN

The mew technology and small disadvantaged business plan should provide a summary of the benefits offered by the mission beyond the scientific benefits brought by obtaining and analyzing the desired scientific data.

1) Small Disadvantaged Business. A summary plan is required specifying the proposed investigation's commitment to meet NASA's SDB participation goals as described in Section XIII of Appendix A of the AO. In addition, as also specified in Appendix A, subcontracting plans will be required to execute the contract for investigation implementation.
2) New Technology. This section should discuss how new technology relates to the proposed investigation, including: (1) insertion of new technology into the project, (2) transfer of new technology from the project to other projects or programs, and (3) commercialization of new technology. The functions that the new technology performs and how it will be demonstrated for the investigation should be described. Also to be discussed is the development of partnerships among space, non-space firms, educational, other nonprofit organizations, and government entities to facilitate technology development, transfer, and commercialization along with how the mission team will implement the transfer and/or commercialization.

I. TECHNICAL DEFINITION (PHASE B) PLAN

This section should describe the plans and products for the technical definition phase (Phase B) of the Project. This section should identify the key mission tradeoffs and options to be investigated during the Phase B and should identify those issues, technologies, and decision points critical to mission success. These plans should include a detailed schedule and define the products (including a Project Plan) and the schedule for their delivery.

J. EDUCATION AND PUBLIC OUTREACH

The education and public outreach plan should provide a summary of the benefits offered by the mission beyond the scientific benefits brought by obtaining and analyzing the desired scientific data.

1) Educational Program Activities. This section of the concept study should explicitly demonstrate how the Principal Investigator and his/her Team intend to realize the goals of the OSS education and public outreach strategy as reflected in the implementation plan for that strategy. It should contain a description of E/PO objectives and the planned activities to be undertaken to achieve those objectives; demonstrate how those plans will actually be implemented (including a timeline for the execution of the of the E/PO program); discuss how the program will be

evaluated; describe the intended involvement of the Principal Investigator and or key science team members in the E/PO effort; address the involvement of educational personnel as well as plans/commitments for partnerships and collaborations with education and outreach organizations; describe how the effort will be organized and managed (including the identification of key personnel who will be actually responsible for overseeing and implementing the E/PO effort); and explain the requested E/PO budget (including expenditures for Co-Is and subcontractors) showing how that budget is related to and supports the planned program. Where appropriate reference may be made to budget information contained in Section K.3. Plans for developing and disseminating education/outreach products and materials, for contributing to the training of underserved and/or underutilized groups in science and technology, and for coordination of the planned E/PO program with other OSS-sponsored education and outreach programs should be addressed. The relationship of the planned E/PO program to any unique scientific or technical aspects of the mission should also be discussed. Details of organizational and management arrangements described in the "Management Plan" may be included by reference and do not have to be repeated in this section of the concept study. Letters of support/commitment from partners/subcontractors and resumes of key E/PO personnel should be included in the appendices to the concept study report. See Appendix C of this document for additional information about the OSS E/PO program, detailed criteria to be used to evaluate the "quality of plans for education and public outreach", and assistance available to help develop the E/PO portion of the concept study and to identify suitable opportunities for partnerships with the E/PO community.

K. COST PLAN

The cost plan should provide information on the anticipated costs for phases A through E for the preferred baseline launch date. Section L contains guidance on information needed regarding being the second SMEX launched. A detailed cost proposal with cost or pricing data as defined in FAR 15.401 is required for Phase B, C, D, and E. A discussion of the basis of estimate should be provided with a discussion of heritage and commonality with other programs. Quantify and explain any cost savings that result from heritage. All costs, including all contributions made to the investigation, should be included. Proposers should complete a summary of total mission cost by fiscal year as shown in Figure 1. The purpose of Figure 1 (Total Mission Cost Funding Profile) is to present all costs *on one page for the entire project* by project Phase (A through E), by participating organization, and by fiscal year. If obligation authority in excess of identified costs is required, the proposal must also indicate the authority needed by year.

In addition, for each phase of the investigation (A, B, C/D, and E) a Time Phased Cost Breakdown for each Work Breakdown Structure (WBS) element, as shown in Figure 2, should be completed. Use only the line items shown in Figure 2 that are relevant

for each phase of the project. The purpose of this set of Figures is to provide detailed insight into how the project allocates funding during each phase of work.

The cost of the entire project, expressed in Real Year dollars, should be summarized on one page, and presented in the format shown in Figure 3. The purpose of Figure 3 is to: (1) provide detailed insight into project costs by cost element, and; (2) provide a basis for comparison of the project proposed cost with the evaluation team's independent cost analysis. Identify each reserve amount to the lowest level consistent with the proposed reserve management strategy. For example, if each subsystem manager will have spending authority over a reserve for the subsystem, each such amount should be identified separately. If more convenient, the reserve details may be shown in a separate table, with totals reported as shown in Figure 3. Show costs for all development elements by recurring and non-recurring components in the format of Figure 4. Show costs (NASA OSS and contributed) associated with each Co-Investigator in the format of Figure 5.

Proposers should include all contributions provided by non-OSS NASA Centers, including Civil Servant services, as well as the cost for the use of Government facilities and equipment on a full-cost accounting basis. All direct and indirect costs associated with the work performed at NASA Centers should be fully costed and accounted for in the proposal and summarized using the template provided in Figure 6. The purpose of this data is twofold: 1) to determine those costs that are included in the NASA OSS cost but are not funded out of the Explorer program, and 2) to determine civil service contributions that are not included in the NASA OSS cost. Teams should work with their respective NASA Centers to develop estimates for these costs.

Note that the definition for program cost element terms shown in the cost figures are given in appendix A to this document. This is not to be confused with the elements of cost listed in 1.e below.

The inflation index provided in Appendix D of this document should be used to calculate all real-year dollar amounts, unless an industry forward pricing rate is used. If something other than the provided inflation index is used, the rates used should be documented.

All costs shall include all burdens and profit/fee in real-year dollars by fiscal year, assuming the inflation rates used by NASA (provided above) or specifically identified industry forward pricing rates. Cost and pricing data must be in accordance with the definitions in FAR 15.401

1. Definition, Design, and Development (Phase B/C/D) Cost Proposal. This section provides a detailed cost proposal for performing Phase B/C/D. The cost proposal should correlate with the plans set forth in the Science, Technical Approach, and Management sections of the concept study.

a. Work Breakdown Structure. A Work Breakdown Structure (WBS) should be included for Phase B/C/D. The structure of the WBS should be consistent with the plans set forth in the Technical Approach and Management sections of the concept study and the Statement of Work provided as an Appendix to the concept study. The WBS shall be described to the subsystem level (e.g., Attitude Control System, Propulsion, Structure and Mechanisms) for the spacecraft and to at least the instrument level for simple instruments and to the major component level for more complicated instruments. All other elements of the WBS should be to the major task level (e.g., Project Management, Systems Engineering, Ground Support Equipment).

b. Workforce Staffing Plan. Provide a workforce staffing plan which is consistent with the Work Breakdown Structure. This workforce staffing plan should include all team member organizations, by organization, and should cover all management, technical (scientific and engineering), and support staff. The workforce staffing plan should be phased by fiscal year. Time commitments for the Principal Investigator, Project Manager, Co-Investigators, and other key personnel should be clearly shown.

c. Proposal Pricing Technique. Describe the process and techniques used to develop the Phase B/C/D cost proposal. For portions of the cost proposal developed using a grass-roots methodology, provide the bases from which the estimates were derived and details on how the estimates were extrapolated from the bases. For portions of the cost proposal derived from vendor quotes/historical actuals/catalogue prices/etc. include sufficient information to understand the fidelity of the values. For portions of cost the proposal derived from analogies, describe the value of and the methodology for extrapolating the analogy. For portions of the cost proposal derived parametrically, provide a description of the cost-estimating model(s) and techniques used in the Phase B/C/D cost estimate. Discuss the heritage of the models and/or techniques applied to this estimate, including any known differences between missions contained in the model's data base and key attributes of the proposed mission. Include the assumptions used as the basis for the Phase B/C/D cost and identify those which are critical to cost sensitivity in the investigation. If any "discounts" were assumed in the cost estimates for business practice initiatives or streamlined technical approaches, describe how these have been incorporated in the cost estimate and will be managed by the investigation team.

d. Phase B/C/D Time-Phased Cost Summary. Provide a summary of the total Phase B/C/D costs consistent with Figure 2. The Phase B/C/D cost

summary should be developed consistent with the Work Breakdown Structure and should include all costs to NASA OSS along with all contributed costs. The Phase B/C/D time phased cost summary should be phased by fiscal year.

e. Elements of Cost Breakdown. To effectively evaluate the Phase B/C/D cost proposals, NASA requires cost or pricing data as defined in FAR 15.401 and supporting evidence stating the basis for the estimated costs by the WBS levels used in Figure 2. This information is in addition to that provided in Figure 1 – 6. The proposal will include, but is not limited to the following elements of cost:

i. Direct Labor Cost and Hours by Labor Category.
   (1) Explain the basis of labor-hour estimates for each of the labor classifications.
   (2) State the number of productive work-hours per month.
   (3) Provide a schedule of the direct labor rates used in the proposal. Discuss the basis for developing the proposed direct labor rates for the team member organizations involved; the forward-pricing method (including midpoint, escalation factors, anticipated impact of future union contracts, etc.); and elements included in the rates, such as overtime, shift differential, incentives, allowances, etc.
   (4) If available, submit evidence of Government approval of direct labor rates for proposal purposes for each labor classification for the proposed performance period.
   (5) If Civil Servant labor is to be used in support of the Phase B/C/D study, but is not to be charged directly to the investigation, then this labor must be considered as a contribution by a domestic partner, subject to the same restrictions as other contributions by domestic or foreign partners. A discussion of the source of funding for the Civil Servant contributions must be provided.

ii. Direct Material. Submit a summary of material and parts costs for each element of the WBS.

iii. Subcontracts. Identify fully each effort (task, item, etc. by WBS element) to be subcontracted, and list the selected or potential subcontractors, locations, amount budgeted/proposed, and types of contracts. Explain the adjustments, if any, and the indirect rates (or burdens) applied to the subcontractors' proposed amounts anticipated. Describe fully the cost analysis or price analysis and the negotiations conducted regarding the proposed subcontracts.

iv. Other Direct Costs.
   (1) Travel, Relocation, and Related Costs. Provide a summary of the travel and relocation costs including the number of trips, duration, and purpose of the trips.
   (2) Computer. Provide a summary of all unique computer-related costs.

(3) Consultants. Indicate the specific task area or problem requiring consultant services. Identify the proposed consultants, and state the quoted daily rate, the estimated number of days, and associated costs (such as travel), if any. State whether the consultant has been compensated at the quoted rate for similar services performed in connection with Government contracts.

(4) Other. Explain and support any other direct costs included in the Phase B/C/D proposal in a manner similar to that described above.

v. Indirect Costs.

(1) List all indirect expense rates for the team member organizations. Indirect expense rates (in the context of this AO) include labor overhead, material overhead, general and administrative (G&A) expenses, and any other cost proposed as an allocation to the proposed direct costs.

(2) If the proposal includes support services for which off-site burden rates are used, provide a schedule of the off-site burden rates. Include a copy of the company policy regarding off-site vs. on-site effort.

(3) If available, submit evidence of Government approval of any/all projected indirect rates for the proposed period of performance. Indicate the status of rate negotiations with the cognizant Government agency, and provide a comparative listing of approved bidding rates and negotiated actual rates for the past five (5) fiscal years.

(4) Discuss the fee arrangements for the major team partners.

2. Mission Operations and Data Analysis (Phase E) Cost Proposal. This section provides a cost proposal for performing the Mission Operations and Data Analysis Phase (Phase E) portion of the mission including Education and Public Outreach. The Phase E cost proposal should correlate with the plans set forth in the Science, Technical Approach, and Management sections. In completing this section, the following guidelines will apply:

a) Work Breakdown Structure. A Work Breakdown Structure (WBS) should be included for the Mission Operations and Data Analysis Phase of the mission. The WBS should be consistent with the plans set forth in the Technical Approach and Management sections and the Statement of Work that is provided as an Appendix.

b) Cost Proposal Pricing Technique. Describe the process and techniques used to develop the Phase E cost proposal. For portions of the cost proposal developed using a grass-roots methodology, provide the bases from which the estimates were derived and details on how the estimates were extrapolated from the bases. For portions of the cost proposal derived from vendor quotes/historical actuals/catalogue prices/etc. include sufficient

information to understand the fidelity of the values. For portions of cost the proposal derived from analogies, describe the value of and the methodology for extrapolating the analogy. For portions of the cost proposal derived parametrically, provide a description of the cost-estimating model(s) and techniques used in your Phase E cost estimate. Discuss the heritage of the models applied to this estimate including any known differences between missions contained in the model's data base and key attributes of the proposed mission. Include the assumptions used as the basis for the Phase E cost and identify those which are critical to cost sensitivity in the investigation. If any "discounts" were assumed in the cost estimates for business practice initiatives or streamlined technical approaches, describe how these have been incorporated in the cost estimate and will be managed by the investigation team.

c) Workforce Staffing Plan. Provide a workforce staffing plan (including civil service) which is consistent with the Work Breakdown Structure. This workforce staffing plan should include all team member organizations and should cover all management, manufacturing, technical (scientific and engineering), and support staff. The workforce staffing plan should be phased by fiscal year. Time commitments for the Principal Investigator, Co-Investigators, Project Manager, and other key personnel should be clearly shown.

d) Phase E Time-Phased Cost Summary. Provide a summary of the total Phase E costs consistent with Figure 2. The Phase E cost summary should be developed consistent with the Work Breakdown Structure and should include all costs to NASA OSS, along with all contributed costs. The Phase E time phased cost summary should be phased by fiscal year.

e) Elements of Cost Break Down. Provide cost or pricing data as defined in FAR 15.401 and supporting evidence stating the basis for the estimated cost including but not limited to the elements of cost described under section K.1.e above.

3. Total E/PO Cost Estimate: This section should summarize the estimated costs to be incurred in Phases A through E of the investigation for the E/PO component and provide supporting budget and workforce details using the E/PO budget and workforce templates contained in Appendix C. This summary should be consistent with and relate directly to the top-level E/PO budget lines in Figures 1-6 as appropriate and describe how these costs relate to the activities, products, programs, partnership arrangements, etc., defined in Section J.

4. Total Mission Cost Estimate. This section should summarize the estimated costs to be incurred in Phases A through E including launch vehicle, upper stages, and launch services; ground segment costs; and cost of activities

associated for social or educational benefits (if not incorporated in any of Phases A through E). The total mission cost estimate should be developed consistent with the Work Breakdown Structure.

This section should include:

Detailed plans for all aspects of the mission not discussed elsewhere in the concept study, including: the launch vehicle, upper stages, and launch services; ground segment; and activities associated with social or educational benefits. Reference may be made to the Technical Approach section of the concept study. In completing this section, the following guidelines will apply:

a. Total Mission Cost. A summary of the Total Mission Cost time-phased by fiscal year must be included in the format shown in Figure 1. This summary should represent the optimum funding profile for the mission. Assets provided as contributions by international or other partners should be included, and clearly identified, as separate line items.

FIGURE 1

TOTAL MISSION COST FUNDING PROFILE TEMPLATE

(FY costs* in Real Year Dollars, Totals in Real Year and FY 2000 Dollars)

Item	FY1	FY2	FY3	FY4	FY5	FYn	...	Total (Real Yr.)	Total (FY 2000)
Phase A	$	$	$	$	$	$	$	$	$
- Organization A									
- Organization B									
- etc.									
Phase B	$	$	$	$	$	$	$	$	$
- Organization A									
Phase C/D	$	$	$	$	$	$	$	$	$
- Organization A									
Phase E									
- Organization A									
Launch services	$	$	$	$	$	$	$	$	$
- Organization A									
Ground Data System Dev	$	$	$	$	$	$	$	$	$
- Organization A									
E/PO									
Other (specify)	$	$	$	$	$	$	$	$	$
NASA OSS Mission Cost	$	$	$	$	$	$	$	$	$
Contributions by Organization (Non-U.S. or U.S.) to:									
Phase A	$	$	$	$	$	$	$	$	$
- Organization A									
Phase B	$	$	$	$	$	$	$	$	$
- Organization A									
Phase C/D	$	$	$	$	$	$	$	$	$
- Organization A									
Phase E									
- Organization A									
Launch Services	$	$	$	$	$	$	$	$	$
- Organization A									
Ground Data System Dev	$	$	$	$	$	$	$	$	$
- Organization A									
E/PO									
Other (specify)	$	$	$	$	$	$	$	$	$
Contributed Costs (Total)	$	$	$	$	$	$	$	$	$
						Mission Totals			$

* Costs should include all costs including fee

FIGURE 2
(Phased costs in Real Year Dollars, Totals in Real Year and FY2000 Dollars)

TIME PHASED COST BREAKDOWN BY WBS AND MAJOR COST CATEGORY					
WBS/Cost Category Description	FY1	FY2	• • •	Total (RY$)	Total (FY2000$)
Total Direct Labor Cost	$	$	$	$	$
WBS 1.0 Management					
WBS 2.0 Spacecraft					
WBS 2.1 Structures & Mechanisms					
WBS 2.2 Propulsion					
etc.					
Total Subcontract Costs	$	$	$	$	$
WBS # and Description					
:					
etc.					
Total Materials & Equipment Cost	$	$	$	$	$
WBS # and Description					
:					
etc.					
Total Reserves	$	$	$	$	$
WBS # and Description					
:					
etc.					
Total Other Costs	$	$	$	$	$
WBS # and Description					
:					
etc.					
Fee					
E/PO					
Other (Specify)					
Total Contract Cost	$	$	$	$	$
Total Other Costs to NASA OSS	$	$	$	$	$
Launch Services					
Ground Segment					
E/PO					
Other (Specify)					
Total Contributions (Non-U.S. or U.S.)	$	$	$	$	$
Organization A:					
WBS # and Description					
etc.					
Organization B:					
WBS # and Description					
etc.					
TOTAL COST FOR PHASE	$	$	$	$	$

Figure 3 Fiscal Year Costs in Real Year Dollars (to nearest thousand)
(Totals in Real Year and Fiscal Year 2000 Dollars)

Cost Element[1]	FY1	FY2	FY3	...	FYn	Total (RY$)	Total (FY2000$)
Phase A							
Reserves							
Total Phase A							
Phase B							
Reserves							
Total Phase B							
Phase C/D							
Instrument A							
Instrument B							
Instr Integ, Assy & Test							
Subtotal - Instruments							
Spacecraft Bus							
Spacecraft Integ, Assy & Test							
Other Hardware Elements							
Launch Ops							
Subtotal - Spacecraft							
Proj Mgmt/Miss Analysis/Sys Eng							
Science Team Support							
Prelaunch GDS/MOS Development							
E/PO, Other[2]							
Subtotal Phase C/D before Reserves							
Instrument Reserves							
Spacecraft Reserves							
Other Reserves							
Total Phase C/D							
Phase E							
MO&DA							
Tracking Services							
E/PO							
Other[2]							
Subtotal Phase E before Reserves							
Reserves							
Total Phase E							
Launch Services							
Total NASA Cost	$	$	$	$	$	$	$
Contributions[2]							
Total Contributions	$	$	$	$	$	$	$
					Total Mission Cost		$

Notes to Figure 3

1 Refer to definitions of Program Cost Elements at end of this Guidelines document

2 Specify each item on a separate line; facilities, etc.

Figure 4

Phase C/D Development Costs
in Real Year Dollars (to nearest thousand)

Cost Element[1]	Non-Recurring	Recurring	Total (RY$)	Total (FY2000$)
Instrument A[2]				
Instrument B[2]				
Instrument n[2]				
Subtotal - Instruments				
Structure and Mechanisms				
Attitude Control				
Power				
Subsystem n				
Subtotal - Spacecraft Bus				
Any other elements (specify)				
Subtotal - Other elements				
Total NASA OSS Development Cost				

1 Refer to definitions of program cost elements in Appendix A of this document
2 Specify each instrument by subsystem/components where possible

FIGURE 5
CO-INVESTIGATOR COMMITMENT AND COST
FUNDING PROFILE TEMPLATE
(FY costs in Real Year Dollars, Totals in Real Year and FY2000 Dollars)

	Phase B	Phase C/D	Phase E	Total (Real Year)	Total (FY 2000)
NASA OSS Cost					
Co-I #1 Name/Organization					
Percent Time					
Cost					
Co-I #2 Name/Organization					
Percent Time					
Cost					
Co-I #n Name/Organization					
Percent Time					
Cost					
Total NASA OSS Co-I Cost					
Contributions					
Co-I #1 Name/Organization					
Percent Time					
Cost					
Co-I #2 Name/Organization					
Percent Time					
Cost					
Co-I #n Name/Organization					
Percent Time					
Cost					
Total Contributed Co-I Cost					

FIGURE 6
NASA CIVIL SERVICE COSTS
FUNDING PROFILE TEMPLATE
(FY costs in Real Year Dollars, Totals in Real Year and FY2000 Dollars)

Item	FY1	FY2	FY3	FY4	FY5	FYn	...	Total (Real Yr.)	Total (FY 2001)
Workforce	$	$	$	$	$	$	$	$	$
- NASA Center A									
- NASA Center B									
- etc.									
Facilities	$	$	$	$	$	$	$	$	$
- NASA Center A									
E/PO									
Other*	$	$	$	$	$	$	$	$	$
- NASA Center A									
NASA Civil Service Costs included in NASA OSS Cost	$	$	$	$	$	$	$	$	$
Contributions by NASA Centers									
Workforce	$	$	$	$	$	$	$	$	$
- NASA Center A									
- NASA Center B	$	$	$	$	$	$	$	$	$
- etc.	$	$	$	$	$	$	$	$	$
Facilities									
- NASA Center A									
E/PO									
Other*									
- NASA Center A									
Contributed NASA Civil Service costs	$	$	$	$	$	$	$	$	$
						Mission Totals			$

*Specify each item on a separate line.

L. CHANGES REQUIRED FOR AND IMPLICATIONS OF BEING THE SECOND SMEX LAUNCHED UNDER THIS AO

In order to quickly execute a contract for the mission selected as the second launch under this AO, the proposer must provide sufficient information to understand the implications of this delay to the science investigation and to the implementation of the mission. The information should be provided in the following format:

Science Investigation Implications. Describe the implications to achieving the proposed science investigation objectives if the mission is delayed.

Implementation Plan Changes: Describe how the proposed implementation activities would be affected by the delay and include a revised version of the schedule presented in the baseline concept study. Describe in detail what tasks would be accomplished in the extended Phase B and provide the same level of information requested in the Technical Definition (Phase B) Plan section (Section I). If Phases C/D are modified, address any risks that might be added to the mission as a result of the delay and how those risks would be managed and mitigated. It is not expected that Phase E will change, but if it does, provide similar information as requested for previous phases.

Cost Plan Changes: If the work/cost content does not change from the baseline, only provide new versions of Figures 1, 3 and 4. The information in the Implementation Plan Changes section should correlate with the revised cost profile. If the content changes, then a new version of Figure 2 is required with sufficient explanation to understand the differences between the baseline costs and the alternate launch date costs. Inflation is not considered a content change.

NOTE:

1. The SMEX NASA OSS cost cap of $75 million (FY 2000 dollars) applies to this alternative. Exceptions to the cost cap for NIAT and increased ELV costs as described previously are also applicable here.

2. The level of funding available for the initial period of Phase B is constrained in FY02. The Team should plan an intelligent and efficient development approach to the delayed launch date with a revised funding profile which stays within the FY funding constraints presented by Marcus Watkins at the Kickoff meeting. If proposed funding levels for this option exceed the available annual resources the required funding level should be justified in the Concept Study Report.

M. APPENDICES

The following additional information is required to be supplied with the Concept Study Report. This information can be included as Appendices to the CSR, and, as such, will not be counted within the specified page limit.

1) Letters of Endorsement. Letters of endorsement must be provided from all organizations participating in and critical to the investigation. Letters of endorsement should be signed by both the lead representative from each organization represented on the team, and by institutional and Government officials authorized to commit their organizations to participation in the proposed investigation. Signed letters of support or commitment must be provided from all E/PO partners or subcontractors detailing their commitment to or involvement in the education and public outreach effort.

2) Relevant Experience and Past Performance. Relevant experience and past performance (successes and failures) of the major team partners in meeting cost and schedule constraints in similar projects within the last ten years should be discussed. A description of each project, its relevance to the proposed investigation, cost and schedule performance, and points of contact (including addresses and phone numbers), should be provided.

3) Resumes. Provide resumes for all key personnel identified in the Management section. Also provide resumes for key E/PO lead personnel. Include resume data on experience which relates to the job these personnel will be doing for the proposed investigation.

4) Statements of Work. Provide draft Statement(s) of Work for all potential contracts with NASA. These Statement(s) of Work should (as a minimum) be for each contract phase (i.e., Phase B/C/D, and Phase E) and clearly define all proposed deliverables (including science data) for each phase, potential requirements for Government facilities and/or Government services, and a proposed schedule for the entire mission.

5) Mission Definition and Requirements Agreement. A draft Mission Definition and Requirements Agreement should be provided. An example of a Mission Definition and Requirements Agreement is provided in the Explorer Program Library.

6) Orbital Debris Analysis. All missions need to conduct a formal assessment of the orbital debris the spacecraft will create upon mission termination. This evaluation can be made with the Debris Assessment Software written and maintained by Orbital Debris Program Office at the Johnson Space Flight Center. The software and additional information can be obtained at
http://www.orbitaldebris.jsc.nasa.gov/mitigate/mitigation.html

The NASA Safety Standard 1740.14 states that the risk of human casualty per reentry event has to be less than 0.0001. For spacecraft at an inclination of 28 degrees, this translates into a total debris area for components and structural fragments surviving reentry of 8 m^2. If the assessment indicates that the spacecraft will produce a larger debris area, a proper disposal of the spacecraft upon mission termination needs to be specified.

7) Data Management Plan. Although no Project Data Management Plan is required for delivery via the Concept Study, this plan will be required at PDR. In the Concept Study Report, however, proposers must discuss all plans (schedules, costs, and deliverables) and their approach and commitment to delivering project data to the appropriate NASA data archives. In addition, this discussion must provide assurance that all activities have been considered and included with appropriate resources separately allocated and budgeted.

8) Incentive Plan(s). Draft Incentive Plans (if applicable) should be included with the concept study. Incentive Plans should outline contractual incentive features for all major team members. Incentive Plans should include both performance and cost incentives, as appropriate.

9) NASA PI Proposing Teams. The same guidelines as in AO Appendix B apply.

10) Technical Content of any International Agreement(s). Draft language for the technical content of any International Agreement(s) are required for all non-U.S. partners in the investigation. A sample agreement is available in the SMEX Explorer Program Library. The draft language should include (i) a brief summary of the mission and the foreign partner's role in it, (ii) a list of NASA's responsibilities within the partnership, and (iii) a list of the non-U.S. partner's responsibilities in within the partnership. Note that NASA prefers to establish agreements with government funding agencies, not with the institution which will be funded to perform the work.

11) Discussion on Compliance with U.S. Export Laws and Regulations. Investigations that include international participation, either through involvement of non-U.S. nationals and/or involvement of non-U.S. entities must include a section discussing compliance with U.S. export laws and regulations; e.g., 22 CFR 120-130, et seq. and 15 CFR 730-774, et seq., as applicable to the scenario surrounding the particular international participation. The discussion must describe in detail the proposed international participation and is to include, but not be limited to, whether or not the international participation may require the proposer to obtain the prior approval of the Department of State or the Department of Commerce via a technical assistance agreement or an export license, or whether a license exemption/exception may apply. If prior approvals via licenses are necessary, discuss whether the license has been applied for or if not, the projected timing of the application and any implications for the schedule. Information regarding U.S.

export regulations is available through Internet URLs http://www.pmdtc.org and http://www.bxa.doc.gov. Proposers are advised that under U.S. law and regulation, spacecraft and their specifically designed, modified or configured systems, components, parts, etc., such as the instrumentation being sought under this AO, are generally considered "Defense Articles" on the United States Munitions List and subject to the provisions of the International Traffic in Arms Regulations, 22 CFR 120-130, et seq.

12) Additional Activities in Response to the NASA Integrated Action Team (NIAT)
NASA recognizes that the recommendations of the NIAT were being finalized at the time of release of the AO. Therefore, to provide some relief in accommodating the costs of these new requirements in the Concept Study, up to $5M (FY00) may be identified, and justified as costs which will not be counted toward the AO cost cap for total mission cost to OSS. To qualify for these exemptions, proposers must identify the additional content that has been added to their project that (i) is required by NIAT and (ii) was not presented in their original proposed project. To simplify the accounting for these costs, proposers should continue to integrate all these costs into the Cost Figures1-6 since these will be required for implementation, but then separately and additionally display these costs in a new line item in Figure 7 (note: none of the costs in this figure count toward cost caps). Since the identification and justification of these activities is in an appendix, brief but adequate definition, description, and justification is the objective. The net result is in effect additions to the Cost Cap which can be used to create greater reserves and margins. Note that one of the key NIAT requirements involves Software I V & V. Proposers should note that a POC for discussion of this requirement is Ken Costello at GSFC (phone: 304-367-8384; email: ken.costello@ivv.nasa.gov.

FUNDING PROFILE TEMPLATE FOR NIAT ACTIVITIES

(FY costs in Real Year Dollars, Totals in Real Year and FY 2000 Dollars)

Figure 7

Item	FY1	FY2	FYn	Total (Real Yr.)	Total (FY 2000)
FMEA, etc.	$	$	$	$	$
- Organization A					
- Organization B					
- etc.					
IV&V	$	$	$	$	$
- Organiztaion A					
Additions to the OSS Cost Cap	$	$	$	$	$

13) Acronyms List

14) References List (Optional) Concept studies may provide, as an appendix, a list of reference documents and materials used in the concept study. The documents and materials themselves cannot be submitted, except as a part of the concept study.

Appendix A to Phase A Study Guidelines
Program Cost Element Definitions

Introduction

This is a short dictionary of definitions for the cost elements shown in the figures and tables and discussed in the body of this *Guidelines and Criteria for the Concept Study Report* document.

Project Management/Mission Analysis/Systems Engineering

Project management costs include all efforts associated with project level planning and directing of prime and subcontractor efforts and interactions, as well as project-level functions such as quality control and product assurance. Mission Analysis includes preflight trajectory analysis and ephemeris development. Systems engineering is the project-level engineering required to ensure that all satellite subsystems and payloads function properly to achieve system goals and requirements. This cost element also includes the data/report generation activities required to produce internal and deliverable documentation. Project management for phase E is to be shown as a separate line item under Phase E (Operations).

Instruments

Instrument costs include costs incurred to design, develop and fabricate the individual scientific instruments or instrument systems through delivery of the instruments to the spacecraft for integration. Costs for instrument integration, assembly, and test are to be shown separately from instrument development. Costs incurred for integration of the instruments to the spacecraft are included in the Spacecraft Integration, Assembly & Test cost element (see below).

Spacecraft Bus

Spacecraft bus costs include costs incurred to design, develop, and fabricate (or procure) the spacecraft subsystems. Costs for integration and assembly are not included in this element. Component level test and burn-in is included in this cost element. System tests are included in Spacecraft IA&T (see below).

Spacecraft Integration, Assembly & Test (IA&T)

S/C integration, assembly and test is the process of integrating all spacecraft subsystems and payloads into a fully tested, operational satellite system. The total cost of IA&T for a satellite includes research/requirements specification, design and scheduling analysis of IA&T procedures, ground support equipment, systems test and evaluation, and test data analyses. Typical satellite system tests include thermal vacuum, thermal cycle, electrical

and mechanical functional, acoustic, vibration, electromagnetic compatibility/interference, and pyroshock.

Launch Checkout & Orbital Operations

Launch checkout and orbital operations support costs are those involving pre-launch planning, launch site support, launch-vehicle integration (spacecraft portion), and the first 30 days of flight operations.

Pre-Launch Science Team Support

Includes all Phase B/C/D (pre-launch) support costs for the science team. (See MO&DA below for post-launch component.)

Pre-Launch GDS/MOS Development

Includes costs associated with development and acquisition of the ground infrastructure used to transport and deliver the telemetry and other data to/from the Mission Operations Center and the Payload Operations Center. (For more information, refer to *NASA's Mission Operations and Communications Services* document and the *Freedom of Choice for Space Operations* document in the EPL.) Includes development of science data processing and analysis capability. Also includes pre-launch training of the command team, development and execution of operations simulations, sequence development, and flight control software. This element includes any mission-unique tracking network development costs.

Mission Operations and Data Analysis (MO&DA)

This cost element refers only to Phase E (post-launch), and has two major components: Mission Operations and Data Analysis. Mission operations comprises all activities required to plan and execute the science objectives, including spacecraft and instrument navigation, control, pointing, health monitoring, and calibration. Data analysis activities include collecting, processing, distributing and archiving the scientific data. MO&DA costs include all post-launch costs for people, procedures, services, hardware and software to carry out these activities. Includes science team support costs post-launch.

Tracking Services including DSN

This line item includes all costs associated with this service for the specific proposed mission profile. (Refer *NASA's Mission Operations and Communications Services* and the *Freedom of Choice for Space Operations* document in the EPL.)

Education and Public Outreach

Includes all costs associated with developing and implementing the proposed project's programs for education and public outreach.

Project-Unique Facilities

If the proposed project requires construction or lease of any ground facilities, include here only the portion of costs to be borne by the proposed project, with description of the nature and extent of any cost-sharing arrangements assumed.

Launch Services

Launch vehicles and services are either procured and provided by NASA to launch spacecraft under fixed price contracts, or provided by the proposer. Launch services can be either ELV or Shuttle opportunities. In the case of an ELV launch, launch service price includes procurement of the ELV, spacecraft-to-launch vehicle integration, placement of spacecraft into designated orbit, analysis, post-flight mission data evaluation, oversight of the launch service and coordination of mission-specific integration activities. For more information on ELV costs, contact Darrell Foster at KSC. (The contact information for Darrel Foster is on page 2 of this document.)

In the case of a Shuttle launch, see the *SMEX Space Shuttle Launch Opportunities* document in the SMEX library for information on costs. Contact J. J. Conwell at JSC at (281) 483-1178 to identify the required opportunity(s) on the Shuttle manifest.

Reserves

In that NASA maintains no reserves for missions, reserves should include those project funds that are not allocated specifically to estimated resources, but are held against contingencies or underestimation of resources to mitigate the investigation risk. Reserves should be reported according to the proposed reserve management strategy. For example, if the reserve is divided into funds to be pre-allocated to the flight system and instrument payload, with another portion held at the project level, specific dollar amounts to fund each must be identified.

NASA Center Costs (all categories)

Additional costs borne by the program for NASA Center participation. For example, there may be additional program management/systems engineering costs, above those incurred by the spacecraft prime contractor, which are due to NASA employee participation. These costs must be reported on a full-cost accounting basis.

Appendix B to Phase A Study Guidelines

Parameters to Consider in developing the CSR

Introduction

This appendix is intended to serve as a "mind jogger" of parameters to consider in the development of the Phase A Concept Study Report. It is for information only and is not all-inclusive.

Communications

Downlink Information.

Data volume (Mbytes/day), bit error rate, onboard storage (Mbytes), power available for communications (watts), number of data dumps per day, spacecraft data destination (e.g., mission operations center), science data destination (e.g., science operations center), maximum time lag between data dump and data arrival at destination, if relevant to science needs.

Uplink Information.

Number of uplinks per day, number of Bytes per uplink, bit error rate, approach and schedule for obtaining license(s) for use of proposed frequency bands.

Attitude and Control

- Control method (3-axis, spinner, gravity gradient, momentum bias, etc.)
- Control reference (solar, inertial, Earth-nadir, Earth-limb, etc.)
- Attitude control requirements for bias, drift, stability or jitter, rate for scanning (each axis)
- Spacecraft attitude knowledge requirements at the instrument interface for bias, drift, jitter, rate for scanning (each axis)
- Agility (maneuvers, scanning, etc.)
- Deployments (solar panel, antennas, etc.)
- Articulation (1,2 -axis solar arrays, antennas, gimbals, etc.)
- On-orbit calibration (alignment, line-of-sight, thermal deformation)
- Attitude knowledge processing: real-time versus postprocessing, spaceborne versus ground

Instrument characteristics

- Bias, drift, and noise of instrument data used in pointing control and knowledge determination.
- Character of significant instrument-generated jitter and momentum.

Definitions of Contingency, Reserves, and Margins

Contingency (or *reserve*) when added to a resource, results in the maximum expected value for that resource. Percent contingency is the value of the contingency divided by the value of the resource less the contingency.
Margin is the difference between the maximum possible value of a resource (the physical limit or the agreed-to limit) and the maximum expected value for a resource. Percent margin for a resource is the available margin divided by its maximum expected value.
Example: A payload in the design phase has an estimated mass of 115 kg including a mass reserve of 15 kg. There is no other payload on the ELV and the ELV provider plans to allot to you the full capability of the vehicle, if needed. The ELV capability is 200 kg. The mass reserve is 15/100 = 15% and the mass margin is 85 kg or 85/115 = 74% Example: The end-of-mission life capability of a spacecraft power system is 200 watts. Your instrument is expected to use 50 watts, including 25% contingency. You are allotted 75 watts by the satellite provider. Your reserve is 10 watts and your margin is 25 watts, or 25/50 = 50%.

OSS GENERAL POLICIES REGARDING E/PO

OSS expects education and public outreach to be a significant part of each OSS flight program and research discipline, and strongly encourages space science researchers to engage actively in education and public outreach as an important component of their NASA-supported professional activities. In order to achieve this goal, OSS has developed a comprehensive approach for making education at all levels (with a particular emphasis on K-14 education) and the enhancement of public understanding of space science integral parts of all of its missions and research programs. The three key documents that establish the basic policies and guide all OSS Education and Public Outreach activities are a strategic plan entitled *Partners in Education: A Strategy for Integrating Education and Public Outreach Into NASA's Space Science Programs* (March 1995), an accompanying implementation plan entitled *Implementing the Office of Space Science (OSS) Education/Public Outreach Strategy* (October 1996), and the *Explanatory Guide to the NASA Office of Space Science Education and Public Outreach Evaluation Criteria* (April 1999). Concept studies should be consistent with the guidance contained in these documents. Additional information on the ongoing OSS E/PO program can also be found in the *Office of Space Science FY 2000 Education and Public Outreach Annual Report.* All of these resources are available through the Explorer Program Library, can be accessed by selecting "Education and Public Outreach" from the menu on the OSS homepage at the World Wide Web address <http://spacescience.nasa.gov>, or may be requested from Dr. Jeffrey Rosendhal, Office of Space Science, Code S, NASA Headquarters, Washington, DC 20546-0001.

In accordance with established OSS policies, Education and Public Outreach (E/PO) is an integral element of the Explorer Program, and it is expected that 1-2% of the total NASA OSS Cost for Explorer missions (excluding launch vehicles) will be allocated to education and public outreach. It should be noted that this funding guideline is intended to apply to the mission as a whole (throughout all phases of the mission) and not necessarily to each individual year. Within the total funding envelope, year-to-year E/PO expenditures should be phased to optimize the output of the planned E/PO program over the life of the mission.

EVALUATION CRITERIA

The “quality of plans for education and public outreach” will be evaluated by appropriately qualified scientific, education, and outreach personnel according to the detailed criteria laid out below. As outlined in Section 7.4.4 of the SMEX Announcement of Opportunity, the results of those evaluations will be explicitly considered by the OSS Selecting Official as an integral part of the overall evaluation and selection process.

There are nine evaluation criteria against which proposed OSS mission E/PO activities will be evaluated --four general criteria, four specific criteria, and one mission criterion.

The general criteria to be applied to the evaluation of the E/PO component of all Concept Study Reports are:

- The quality, scope, and realism of the planned E/PO program including the adequacy, appropriateness, and realism of the proposed budget;

- The capability and commitment of the PI and the PI's team and the direct involvement of one or more science team members in overseeing and carrying out the planned E/PO program;

- The establishment or continuation of effective partnerships with institutions and/or personnel in the fields of education and/or public outreach as the basis for and an integral element of the planned E/PO program;

- The adequacy of plans for evaluating the effectiveness and impact of the proposed education/outreach activity.

To further ensure that the goals and objectives of the OSS E/PO strategy are realized in practice, proposals will also be evaluated using the following specific criteria listed below. Based on the funding guidelines given above, the E/PO programs described in the Concept Study Reports will involve the expenditure of substantial resources. Therefore, it is expected that planned E/PO programs will have a breadth and depth commensurate with these resources. Such programs are expected to be multi-faceted in nature, address a number of different aspects of education and outreach contained in the specific criteria, and have state, regional, or national scope. The specific E/PO criteria are:

- For programs dealing directly with or strongly affecting the formal education system (e.g., through teacher workshops or student programs carried out at informal education institutions such as science museums and planetariums), the degree to which the planned E/PO effort is aligned with and linked to nationally recognized and endorsed education reform efforts and/or reform efforts at the state or local levels;

- The degree to which the planned E/PO effort contributes to the training of underserved and/or underutilized groups and their involvement in and broad understanding of science and technology;

- The potential for the planned E/PO activity to expand its scope by having an impact beyond the direct beneficiaries, reaching large audiences, being suitable for replication or broad dissemination, or drawing on resources beyond those directly requested in the proposal.

- Plans (where appropriate) for coordination of the E/PO program with other OSS-sponsored education and outreach programs

The mission criterion to be explicitly considered as part of the evaluation of the E/PO component of all Concept Study Reports is:

- The relationship of the planned E/PO program to any unique scientific or technical aspects of the mission.

Although creativity and innovation are certainly encouraged, note that neither of these sets of criteria focuses on the originality of the proposed effort. Instead, NASA seeks assurance that the Principal Investigator is personally committed to the E/PO effort and the mission PI and/or appropriate research team members will actively be involved in carrying out a meaningful, effective, credible, and appropriate E/PO program; that such a program has been carefully planned and will be effectively executed; and that the proposed investment of resources will make a significant contribution toward meeting OSS E/PO goals and objectives.

In order to provide further insight to PIs and their teams about the meaning of these evaluation criteria (and to ensure that the E/PO portions of the concept studies will be both developed and evaluated on a consistent basis), OSS has developed an *Explanatory Guide to the Office of Space Science Education and Public Outreach Evaluation Criteria*. This Guide is not an extension of the E/PO requirements or criteria but is meant to provide an easy-to-follow introduction to the OSS Education and Public Outreach Program using a series of Frequently Asked Questions (FAQs) followed by a detailed discussion of the E/PO review criteria. "Indicators" contained in that discussion are the ones used by reviewers as the basis for their evaluation. Therefore, all PIs are strongly urged to carefully review this Explanatory Guide as they develop their concept studies.

ASSISTANCE FOR THE PREPARATION OF E/PO CONCEPT STUDIES

NASA OSS has established a nation-wide Support Network of space science education/public outreach groups one of whose purposes is to directly aid space science investigators in identifying and developing high quality, highly-leveraged E/PO opportunities. This infrastructure provides the coordination, background, and linkages for fostering partnerships between the space science and E/PO communities, and the services needed to establish and maintain a vital national, coordinated, long-term OSS E/PO program. Of particular interest are two elements of this system (which are also described in more detail in the OSS education/outreach implementation plan referred to above:

• Four OSS science theme-oriented E/PO "Forums" have been established to help orchestrate and organize in a comprehensive way the education/outreach aspects of OSS space science missions and research programs, and provide both the space science and education communities with ready access to relevant E/PO programs and products; and

• Five regional E/PO "Broker/Facilitators" to search out and establish high leverage opportunities, arrange alliances between educators and OSS-supported scientists, and help scientists turn results from space science missions and programs into educationally-appropriate activities suitable for regional and/or national dissemination

SMEX PIs and their teams are strongly encouraged to make use of these groups in developing their Concept Study Reports to help identify suitable E/PO opportunities and arrange appropriate alliances. PIs should be careful to note that these Forums and Broker/Facilitators have been established to provide help, but the responsibility for actually developing the E/PO program and preparing this portion of the Concept Study remains with the Principal Investigator. Points of contact for E/PO Forums and Broker/Facilitators may be found through the OSS Education and Public Outreach Homepage referred to above by clicking on "Support Network." In accord with the Operating Principles developed by the Support Network, discussions with individual Teams developing concept studies will be treated as proprietary.

TEMPLATES FOR E/PO COST AND WORKFORCE

E/PO Template #1

E/PO Program Budget

(FY costs in Real Year Dollars, Totals in Real Year and FY 2000 Dollars)

	FY1	FY2	FY3	FYn	Total (Real Yr.)	Total (FY 2000)
Personnel						
Consultants						
Stipends						
Equipment						
Travel						
Supplies						
Subcontract #1						
Subcontract #2						
Subcontract #n						
Misc						
Indirect						
TOTAL						

E/PO Template #2

Subcontract Budgets

(Costs in Real Year Dollars, Totals in Real Year and FY 2000 Dollars)

	Subcontract #1	Subcontract #2	Subcontract #n
Personnel			
Consultants			
Stipends			
Equipment			
Travel			
Supplies			
Other			
TOTAL (Real Yr.)			
TOTAL (FY 2000)			

E/PO Template #3

Key Personnel

(Percent Time Committed/Direct Costs, Including Benefits,
in Real Year Dollars, Totals in Real Year and FY 2000 Dollars)

	FY1	FY2	FY3	FYn	Total (Real Yr.)	Total (FY 2000)
Institution 1						
PI (% time)						
PI (direct cost)						
E/PO lead (% time)						
E/PO (direct cost)						
Institution 2						
PI (% time)						
PI (direct cost)						
E/PO lead (% time)						
E/PO (direct cost)						
Institution n						
PI (% time)						
PI (direct cost)						
E/PO lead (% time)						
E/PO (direct cost)						

Appendix D to Phase A Study Guidelines
Inflation Index

Fiscal Year	2000	2001	2002	2003	2004	2005
Inflation Rate	0%	2.80%	2.80%	2.80%	2.80%	2.80%
Cumulative Inflation Index	1	1.028	1.057	1.087	1.118	1.15

Use an inflation rate of 2.8% for years beyond 2005